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A NEW SPECIES OF *ACANTHEMBLEMARIA* FROM  
MALPELO ISLAND, WITH A KEY TO THE PACIFIC  
MEMBERS OF THE GENUS (PISCES: CHAENOPSIDAE)

By

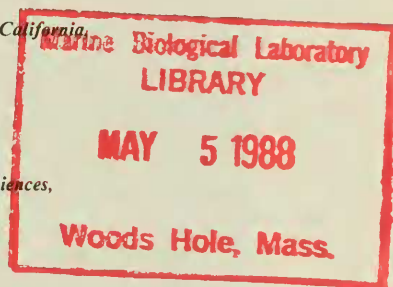
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**ABSTRACT:** A new chaenopsid blenny, *Acanthemblemaria stephensi* sp. nov., of the *hancocki* species complex is described from Isla Malpelo off the Pacific Coast of Colombia. *Acanthemblemaria stephensi* is distinguished from all its congeners by color pattern and details of head spination and is regarded as endemic to the oceanic Isla Malpelo. Vertebral numbers are given for all Pacific species of the genus, and an identification key is presented.

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INTRODUCTION

The family Chaenopsidae comprises a group of small, mostly tube-dwelling, blennioid fishes of the American tropics. The most speciose genus of the family is *Acanthemblemaria*, with 14 species currently recognized. The discovery of an additional species at the isolated volcanic Isla Malpelo, 345 km off the Pacific coast of Colombia, brings the total to 15, with 8 in the Atlantic and 7 in the Pacific. The last comprehensive review of the species of *Acanthemblemaria* was that of Stephens (1963), at which time four species were known from the Pacific. The addition of three species has created problems of identification. We therefore present a key to the Pacific

species of the genus, and give data on vertebral numbers (Table 2).

Material of the new species was collected by a joint Smithsonian Tropical Research Institute/U.S. Navy project, many results of which, including general descriptions of the geology and subtidal communities of Malpelo, have been published (Graham 1975).

METHODS AND MATERIALS

In general the methods of Stephens (1963) have been followed except that the parietals of Stephens are frontals in our terminology and procurrent caudal rays were not enumerated.

Head pore terminology is mostly that of Smith-

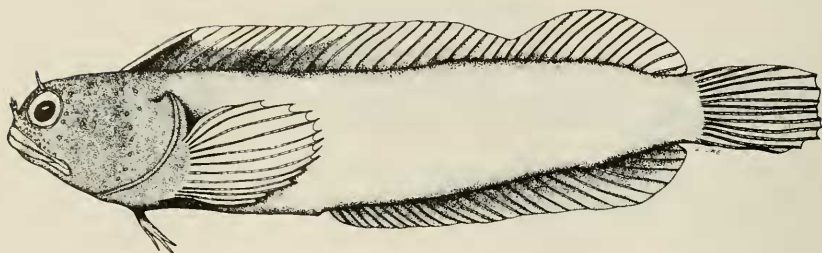


FIGURE 1. *Acanthemblemaria stephensi* Rosenblatt and McCosker, sp. nov. Illustration of the holotype, SIO 72-79, a 33.1 mm (SL) male.

Vaniz and Palacio (1974). Johnson and Greenfield (1976) modified that terminology by introducing the name "commissural pore(s)" for median pores in the frontals, "anterofrontal pores" for the pores at the anterior termination of each frontal, and "nasal pores" for the pores at the anterior end of the nasals. Although pore terminology would seem to be sufficiently encumbered now, it is advantageous to recognize yet another pore group in *Acanthemblemaria*. This may be termed the median interorbital group. It consists of one to six pores on the frontals in or on the edge of the interorbital groove (see Fig. 2E). There are always one or two median pores (commissural pores of Johnson and Greenfield) and from zero to four lateral pores, depending on the species. The lateral pores are posterior to the median pore(s). The lateral pores were included in the count of frontal pores by Stephens (1963) with Smith-Vaniz and Palacio (1974). The latter authors did not include median pores in their extensive discussion other than to state that "interorbital pores were not included in the frontal pore count." However, they did illustrate them in figures 4, 5, and 6. Stephens referred to median pores, but did not illustrate them, and it is difficult to interpret his counts.

As proportional measurements are almost never used in the identification of these fishes, and because most of our type material is distorted and not well preserved, measurements are presented only for the holotype. Vertebral and dorsal and anal ray counts were made from ra-

diographs. There is considerable variability in which vertebra bears the first haemal spine; the vertebra with which the pterygiophores of the anal spines are associated was always counted as the first caudal vertebra. Counts include the ural centrum.

Specimens utilized are housed in the Ichthyology Department, California Academy of Sciences (CAS), or the Marine Vertebrates Collection, Scripps Institution of Oceanography (SIO). Material utilized in preparation of Table 2 is as follows: *A. balanorum*, SIO 62-55; *A. castroi*, CAS 36989, CAS 36990, CAS 39246, CAS 39254, CAS 39333, SIO 69-1003; *A. crockeri*, CAS uncat. Acc. 1964-VII, CAS W51-8, CAS W52-51; *A. exilispinus*, CAS 35574, CAS 35643; *A. hancocki*, CAS 34473, SIO 70-359; and *A. macrospilus*, SIO 65-318.

### *Acanthemblemaria stephensi*

Rosenblatt and McCosker, sp. nov.

(Figures 1, 2A, B)

*Acanthemblemaria* new species. McCosker and Rosenblatt 1975: 93. Listed.

**DIAGNOSIS.**—An *Acanthemblemaria* with posterior frontal spines small and erect, in a triangular patch crossing midline of head, with posterior margin of patch curved and extending behind orbits less than one-half way to dorsal origin. Orbital flange of second infraorbital smooth. Orbital tentacle simple. Body plain brown or with indistinct bars; head of males dark,

FIGURE 2. Scanning electron micrographs of the cranial spines and pore patterns of the Pacific species of *Acanthemblemaria*. All specimens are males. The location of the median interorbital pores are indicated by arrows on E. (A, B) *A. stephensi*, SIO 72-97, 36 mm (SL), paratype; (C) *A. macrospilus*, SIO 65-318, 37 mm (SL); (D) *A. hancocki*, CAS 35644, 29 mm (SL); (E) *A. balanorum*, SIO 62-55, 35 mm (SL); (F) *A. castroi*, CAS 30912, 35 mm (SL); (G) *A. exilispinus*, CAS 35643, 39 mm (SL); and (H) *A. crockeri* CAS 58051, 33 mm (SL).

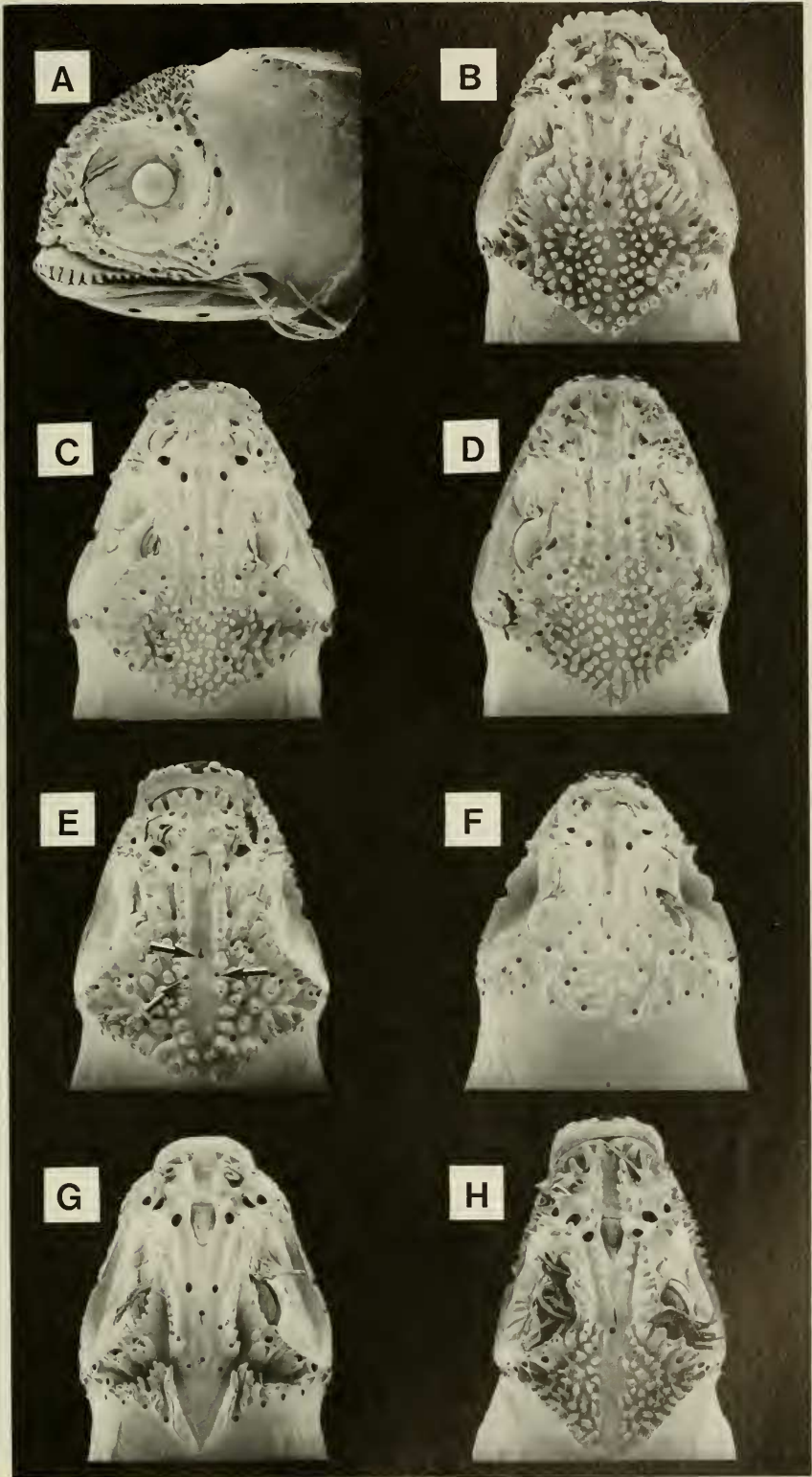


TABLE 1. FREQUENCY DISTRIBUTION OF DORSAL RAYS IN *ACANTHEMBLEMARIA STEPHENSI*. Asterisk indicates count of holotype.

Soft rays	Spines			
	22	23	24	25
11				1
12	1	7	21*	
13			1	

and strongly contrasted with body. The new species may be separated from its closest relatives using the characters within the key.

MEASUREMENTS OF HOLOTYPE (IN MM).—Standard length 33.1; head length 8.5; head depth 5.0; upper jaw length 5.0; orbit length 2.1; snout length 1.4; interorbital width 1.6; predorsal length 5.5; preanal length 15.2; caudal peduncle length 2.5; pectoral length 5.2; longest dorsal spine 6.9; orbital cirrus length 1.0.

DESCRIPTION.—(Additional meristic data are in Tables 1 and 2.) Values in parentheses are means  $\pm$  one standard error. Total dorsal rays 34–37 ( $35.7 \pm 0.10$ ); dorsal spines 22–25 ( $23.8 \pm 0.15$ ); dorsal soft-rays 11–13 ( $12.0 \pm 0.18$ ); anal rays II, 24–25 ( $24.1 \pm 0.05$ ); pectoral rays 13.0 ( $n = 42$ ); vertebrae 41–43 ( $41.8 \pm 0.09$ ); pelvic rays I,3; principal caudal rays 13.

Body relatively elongate, as in all chaenopsids. On a continuum within the genus *Acanthemblemaria* from slender and elongate in *A. chaplini* through intermediate in *A. exilispinus* to robust in *A. castroi*, *A. stephensi* falls between the two latter species. Head length 3.7–4.0 in standard length. Depth of head about 1.5 and width about 1.8 in head length. Upper jaw about 2 in head, extending about to posterior margin of 2nd infraorbital. Orbit about 2 in upper jaw length. A

simple, slender orbital tentacle on dorsal margin of eye. Tentacle in males slightly longer than pupil length, that of females about one-half as long. Anterior nostril in a short tube surmounted by a palmately-branched posterior flap. Opercle free from body dorsally.

An outer row of 10–12 teeth on each premaxilla. Medial teeth flattened, protruding, and almost incisiform, lateral teeth decreasing in size and becoming progressively more pointed. An inner patch of small teeth, pointed in females and almost granular in males, behind medial teeth. Lower jaw with a row of 8 incisiform teeth on expanded anterior portion and about 10 stout conical teeth on straight portion. A patch of small teeth behind incisors. Vomer with 2 stout teeth, one behind the other, on each side. Palatines with two rows of stout teeth, 7 in outer row and 4 in inner.

Head spines are illustrated in Figure 2. Two rows of blunt spines on first infraorbital, one on ventral margin, and another at mid-width. Upper margin with one or two anterior spines, otherwise smooth. Second infraorbital with a few rugosities ventrally on surface, margins smooth. Nasals with a semicircle of spines medial to, and a patch of spines lateral to, anterior nostril. An isolated spine at the level of and medial to each posterior nostril. Frontal bones spinose. A row of spines on orbital rim, extending from articulation with nasal to about level of pupil posteriorly. A weak notch where anterior and posterior orbital flanges meet, at level of orbital tentacle. Two rows of spines on each side between orbits, separated by a median groove. Posterior to rear margin of pupil the interorbital rows broaden into a broadly triangular to rounded patch of spines that is continuous across the top of the head. The posterior margin of this

TABLE 2. FREQUENCY DISTRIBUTION OF VERTEBRAL NUMBER IN PACIFIC SPECIES OF *ACANTHEMBLEMARIA*. Asterisk indicates count of holotype.

	Precaudal				Caudal							Total						
	10	11	12	13	29	30	31	32	33	34	35	41	42	43	44	45	46	47
<i>balanorum</i>		17					4	9	3	1			4	9	3	1		
<i>castroi</i>		13						4	6	2	1			4	6	2	1	
<i>crockeri</i>		8	17					9	12	3	1				13	7	3	1
<i>exilispinus</i>			10	2	1	10	1					1	8	3				
<i>hancocki</i>	2	23				8	15	2				8	15	2				
<i>macrospilus</i>		11						8	3					8	3			
<i>stephensi</i>		31*				8	22*	1				8	22*	1				



patch slightly behind the rear margin of the orbits. Spines more pointed, and slightly larger, in males.

Mandibular pores 4; common pores (between mandibular and preopercular series) 2, one above the other, the ventral smaller; preopercular 5; lateral supratemporal 5; median supratemporal 3, arranged in a forward-directed triangle; supraorbital 3 or (usually) 4; posterior infraorbital 5; anterior infraorbital 2; frontal 6; median interorbital 3; anterior frontal 1; nasal 2.

Dorsal origin just behind occiput, over preopercle. Spinous dorsal low, spines increasing gradually in length to about the 20th, then decreasing to last. First dorsal soft-ray abruptly higher, so that fin is notched. Margin of soft dorsal rounded. Last dorsal and anal rays attached to caudal peduncle by a membrane well before insertion of first principal caudal ray. Anal fin relatively low, its margin straight anteriorly, rounded posteriorly. Caudal margin truncate to rounded. Pectorals fanlike, the lower three or four rays somewhat thickened and exerted, more in males. Middle pelvic soft-ray longest, fin membrane not extending to tips of pelvic rays.

Color descriptions are based on alcoholic specimens. Body ground color of males evenly brown or dark tan, with a suggestion of barring. Head dark, almost black, particularly ventral parts and branchiostegal membrane, so that it contrasts strongly with the body. Lips white medially about as far back as level of the pupil, as is the underside of chin. Nasal and orbital tentacles white. (It is likely that the white areas are red in life, as is the case in *Coralliozetus angelica*.) Spinous dorsal with a darker area between 1st and 2nd spines, remainder of fin dusky basally, clear distally on its anterior part, entire fin becoming dusky posteriorly. Anal dusky, darker near margin, so that when fin is depressed there is the appearance of a dark edging. Pectorals and caudal rays dusky, membranes clear. Lower 4–6 pectoral rays of males white distally. Pelvics dusky.

Females differ chiefly from males in that the body and head are lighter and more uniform in color, so that the head is not as contrasted with the body. Also, there is a dark area of pigment on the head that rims the lower margin of the orbit and then runs across the chin just behind the mandibular symphysis. In general the fins are lighter and less contrastingly colored in females. A female from SIO 72-97 has a unique

body color pattern. There is a row of 7 dark spots along the midline beginning under the middle of the spinous dorsal. The first 5 spots have lighter centers. There are also 7 small dots along the dorsal base, over the interspaces between the spots. The closest approach to this color pattern among the other females is found on a few individuals that have 5 or 6 vague broad bars.

**MATERIAL EXAMINED.**—All specimens were collected between 29 February and 3 March 1972 by personnel of the Smithsonian party (Graham 1975). Holotype: SIO 72-79, a 33.1 mm male taken with rotenone on the NE side of Isla Malpelo, Colombia (3°51'07"N, 81°35'40"W), at a depth of 0–10 m on 3 March 1972, by Jeffrey B. Graham and party. Paratypes: SIO 72-97, taken with and bearing the same data as the holotype, 38 (17–33 mm); SIO 72-96, Isla Malpelo, 17 (16–40 mm); CAS 31542, Isla Malpelo, 4 (29–37 mm).

**ETYMOLOGY.**—Named for John S. Stephens, Jr., the major contributor to present knowledge of systematics of the Chaenopsidae.

**DISTRIBUTION.**—Known only from Isla Malpelo, Colombia. It may be that *A. stephensi* also occurs on the mainland, but remains uncollected there. This is of course possible, considering that the area south of Panamá has not been collected very systematically or intensively. However the Argosy Expedition did include rotenone stations in Colombia and Ecuador (Stephens et al. 1966) and did not find this species, although other chaenopsids were taken. Also, on biogeographic grounds, a species living on the Colombian coast would be expected to occur as far north as Panamá and Costa Rica (Stephens 1963), areas that have been well collected by ichthyocide and diving. McCosker and Rosenblatt (1975) noted certain elements in the fish faunas linking Malpelo and the Galápagos Islands and *A. stephensi* might be expected to occur at that group. However, it is unlikely that *A. stephensi* occurs undiscovered at the well-collected Galápagos. If *A. stephensi* is indeed a Malpelo endemic, it is not unique. Three other fishes, two alpheid shrimps, a crab, and a starfish are thus far known only from the island (papers in Graham 1975). Malpelo is a small island (about  $2 \times 0.75$  km) with a perimeter of approximately 6 km. All of the endemic species belong to groups with larvae that are, at least for a time, planktonic. Nothing is known of detailed current patterns around the island, but conservation of young must be a major problem faced by the Malpelo endemics.

**GENERIC PLACEMENT.**—According to Stephens

(1963) two morphological features unite the species placed in *Acanthemblemaria* and separate them from all other chaenopsids. These are the presence of spines on the frontal bones and the arrangement of the palatine teeth in 2 rows. However, Stephens and Cervigon (*in* Stephens 1970) subsequently described a species of *Emblemaria*, *E. diphyodontis*, with biserial palatine teeth, which consequently will not run to a genus in Stephens's (1963) key. The independent acquisition of this feature by a single species of *Emblemaria* does not necessarily vitiate it as an indicator of relationship of the species of *Acanthemblemaria*. The high spinous dorsal, lack of head spines, and other characters indicate that *E. diphyodontis* is properly placed in *Emblemaria*, and that the presence of 2 rows of palatine teeth in *Acanthemblemaria* and *E. diphyodontis* is a homoplasy.

Another aspect of jaw structure and dentition is worthy of comment. The lower jaw in *Acanthemblemaria* is expanded distally, then abruptly constricted, with the rami straight and almost parallel. This formation has been variously described as resembling an old-fashioned keyhole (Beebe and Tee-Van 1938) or the jaws of a hippopotamus (Myers and Reid 1936), and illustrated by Böhlke (1957). The peculiar shape has a functional significance. The incisiform teeth on the expanded anterior portion of the lower jaw oppose similar teeth on the premaxillae. However the stout teeth on the rami of the lower jaw oppose the equally stout palatine teeth, providing a sort of "double-grip."

The species currently placed in *Acanthemblemaria* do seem to form a natural group. That is, taken pairwise and severally they are more similar to one another than to other chaenopsids, although the only unequivocal specialization is the presence of serrations or spines on the supraorbital ridge of the frontals, and even these may be much reduced in *A. castroi*.

IDENTIFICATION.—The characters given in the diagnosis serve to distinguish *A. stephensi* from its congeners. The number of Pacific species of *Acanthemblemaria* has almost doubled since Stephens's (1963) treatment. Therefore a key to the Pacific species is presented here:

- 1A. Orbital tentacle bushlike, with several branches springing from a common base; a dorsoventrally oval, chocolate-brown spot, outlined with black, on cheek, cov-

ering area between orbit and opercle .....  
*A. crockeri* Beebe and Tee-Van, 1938.  
 Gulf of California

- 1B. Orbital tentacle not bushlike, simple, bifid near tip or pinnately branched; no such spot on cheeks (a dorsal dark area, if present, to midline only) ..... 2

- 2A. Posterior frontal spines in 2 isolated patches borne on elevated ridges, each patch smaller than eye diameter in maximum dimension (Fig. 2G); 5 vomerine teeth in a crescentic row; precaudal vertebrae 12–13 .....

*A. exilispinus* Stephens, 1963.  
 Port Parker, Costa Rica to  
 Isla de la Plata, Ecuador

- 2B. Posterior frontal spines continuous across midline of head or separated by a narrow groove into 2 patches each larger than a pupil diameter, or represented by low ridges (Fig. 2A–F); vomerine teeth 4, 2 on each side of vomer; precaudal vertebrae 10 or 11 ..... 3

- 3A. Head spines high and conspicuous, often club-shaped; frontal spines separated by a groove which may almost be roofed by expanded tips of spines (Fig. 2E); caudal emarginate .....

*A. balanorum* Brock, 1940. Gulf of  
 California to Bahía de Banderas, México

- 3B. Head spines blunt to pointed, or represented by low ridges; posterior frontal spines either continuous across midline or separated only anteriorly by a backward prolongation of interorbital groove (Fig. 2A, C, D, F); caudal rounded to truncate ..... 4

- 4A. Posterior prolongation of infraorbitals at lower rear corner of eye long, reaching back to rictus, and covering entire maxilla; frontal spines either sparse, low, and blunt, or represented by low ridges<sup>1</sup> (Fig. 2F); head of males not dark and sharply

<sup>1</sup> The presence of spines or ridges on the frontals is not a simple function of size of specimen as suggested by Stephens and Hobson (*in* Stephens et al. 1966). Our largest specimen (a 52.5 mm male paratype, SIO 64-1003) has discrete spines, but two females from the same lot, 24 and 28 mm, respectively, have skin-covered ridges. Although all of the specimens with ridges and spines are males, females rarely may have serrated ridges, and a 40 mm male has ridges only.

- contrasted with body color .....  
 ..... *A. castroi* Stephens and Hobson, in  
 Stephens et al. 1966. Galápagos Islands
- 4B. Junction of infraorbitals at lower rear corner of eye rounded to acute, never prolonged as above; frontal spines numerous and pointed (Fig. 2A, C, D); head of males dark and sharply contrasted with body color ..... 5
- 5A. Orbital flange of second infraorbital smooth (Fig. 2B); body plain brown or lightly barred ..... *A. stephensi* sp. nov.  
 Isla Malpelo, Colombia
- 5B. Rim of orbital flange of second infraorbital serrate, or with tubercles; a series of spots down sides ..... 6
- 6A. A single row of 6 to 8 large brown spots, most larger than orbit diameter, along sides; dorsal spines 23–25, usually 24, anal soft-rays 24–26, usually 25 .....  
 ..... *A. macrospilus* Brock, 1940.  
 Gulf of California to Acapulco; Islas Revillagigedo, Isla del Coco, Costa Rica
- 6B. Three rows of small brown dots along sides; dorsal spines 23–24, usually 23, anal soft-rays 23–25, usually 24 .....  
 ..... *A. hancocki* Myers and Reid, 1936.  
 Port Parker, Costa Rica to  
 Isla de la Plata, Ecuador

**RELATIONSHIPS.**—The morphological similarity of the Pacific species *A. hancocki*, *macrospilus*, and *balanorum* was noted by Stephens (1963), who referred to them as the “*hancocki* species group.” Stephens et al. (1966) placed *A. castroi* in the group, and subsequently Smith-Vaniz and Palacio (1974) referred *A. rivasi* Stephens, 1970, of the Atlantic to the group. Stephens had related the three Pacific species mainly on the basis of having blunt head spines not arranged in isolated patches. Smith-Vaniz and Palacio further characterized the group as having “rather robust bodies, typically 10 or 11 precaudal vertebrae, dorsal fin distinctly notched at junction of spinous and segmented rays, supraorbital cirrus usually simple or bifid and vomerine teeth separated by a median hiatus.” We agree both with the reality of the *hancocki* group and its species composition, although none of the defining characters, with the exception of the median toothless space on the vomer, can be demonstrated to be a synapomorphy. There is

variability within the *hancocki* group in the arrangement of the pores of the median interorbital group. All the species except for *A. balanorum* and *castroi* have two median pores and no posterior lateral ones (e.g., Fig. 2B). *Acanthemblemarmaria castroi* is unique in the genus in having 2 pairs of posterior laterals (Fig. 2F). *Acanthemblemarmaria balanorum* (Fig. 2E) agrees with the Atlantic species *chaplini*, *medusa*, *greenfieldi*, *betinensis*, and *maria* and the Pacific *crockeri* in having a triangle of a single median and 2 posterior lateral pores. This latter arrangement is also found in *Ekemblemaria*, regarded by Stephens (1963) as the plesiomorphic sister group of *Acanthemblemarmaria*.

*Acanthemblemarmaria balanorum* then is the plesiomorphic sister group of the other *hancocki* group species. *Acanthemblemarmaria castroi* has retained the lateral pores and is autapomorphic in the presence of another pair of posterior lateral pores and the coalescence of head spines into ridges. It is the plesiomorphic sister group of *A. hancocki*, *macrospilus*, *rivasi*, and *stephensi*, which are synapomorphic in loss of the posterior lateral pores.

*Acanthemblemarmaria stephensi* is most similar to *A. hancocki*. In particular, the two agree in details of spination of the frontals, in that the frontal spines are short and numerous and the interorbital groove does not continue posteriorly so as to separate the frontal spines into two patches behind the eye. In this feature the two species agree with *A. rivasi* of the Atlantic, which also is similar in having a black spot or streak between the first and second dorsal spines. (This last feature is also found in some male specimens of *A. castroi*, and other species in the genus have dark areas on the anterior part of the dorsal, although not in that precise place.) *Acanthemblemarmaria hancocki* and *rivasi* further agree, and differ from *A. stephensi*, in having a series of spots along the midline, and saddles along the base of the dorsal. *Acanthemblemarmaria macrospilus* also has this coloration. *Acanthemblemarmaria hancocki* and *macrospilus* agree, and differ from *rivasi* and *stephensi*, in having spines on the flange of the posterior infraorbital. Such spines are present in the Atlantic *A. maria* and *spinosa* as well, but this may reasonably be regarded as a homoplasy, since these species represent the extreme of spine development in the genus. *Acanthemblemarmaria rivasi* and *A. castroi* are unique in the genus in having a rear prolongation



of the infraorbitals at their juncture. The species have little else in common beside generic characters, and it is unlikely that this feature, which functionally improves lateral bracing of the upper jaw (Rosenblatt and Stephens 1978) indicates any particularly close relationship.

Smith-Vaniz and Palacio (1974) have commented on the difficulty of constructing a phylogeny for the species of *Acanthemblemaria*. Although we have been able to further clarify relationships within the *hancocki* group, we can still only concur. It may be that in this and other speciose genera of reef fishes, a real understanding of relationships and phylogeny awaits the application of nonmorphological techniques such as biochemical genetics.

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